LMS-D6
DIGITAL LOUDSPEAKER MANAGEMENT SYSTEM

USER'S MANUAL

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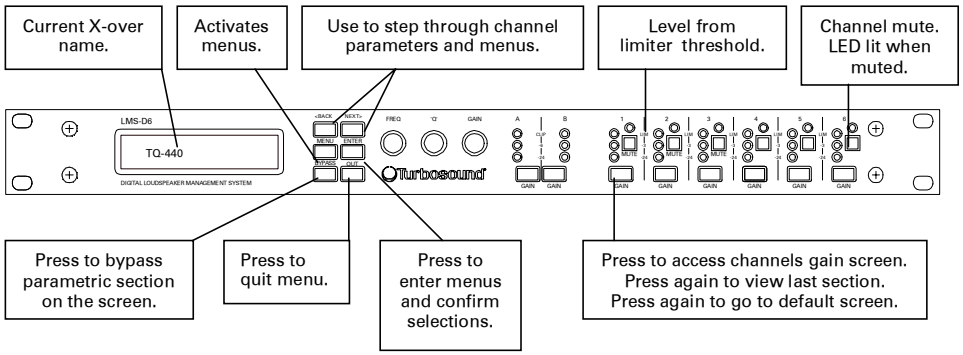
LMS-D6 QUICK REFERENCE


Current X-over name.
Activates menus.
Use to step through channel parameters and menus.
Level from limiter threshold.
Channel mute. LED lit when muted.
LMS-D6
TQ-440
DIGITAL LOUDSPEAKER MANAGEMENT SYSTEM
Turbosound
Press to bypass parametric section on the screen.
Press to quit menu.
Press to enter menus and confirm selections.
Press to access channels gain screen. Press again to view last section. Press again to go to default screen.

To **access a channel** press the appropriate channel's ***'GAIN'*** button. When you press the button once you will get that channel's gain screen. To scroll through a channel's parameters, use the ***'BACK'*** and ***'NEXT'*** keys. (If you press the gain button a second time, you will get the last parameter viewed. A third press will take you back to the default screen.)

To **enter the menus,** press the ***'MENU'*** key. Use the ***'BACK'*** and ***'NEXT'*** keys to take you to the sub-menu you require. ***'ENTER'*** will take you into the sub-menu you have selected. Use the ***'BACK'*** and ***'NEXT'*** keys to select the menu you require. Press ***'ENTER'*** to take you into the menu selected. ***'BACK'*** and ***'NEXT'*** will then select the menu options. Use ***'ENTER'*** to confirm selection.

MENUS:

X-over Sub-Menu: Used for storing and recalling X-overs including format, output EQ, output delay, output gain and limiter settings. Also used for designing a new X-over.

Security Sub-Menu: Used for locking various features of the unit with a unique 4 digit code.

System Sub-Menu: Used to view reports of the unit's status. Other options include whether the parametrics are displayed in Q or bandwidth and if the meters are pre or post mute.

Notes:
1. The output meters show level, in dB's, from limiter threshold. The input meters show level, in dB's, from input clip.
2. HPF's and LPF's are defined independently on each channel.
3. To get access to the limiter attack and release, select 'Auto Limiter TC' to No, when designing a X-over.
4. To show parametric filters in bandwidth ('BW'), rather than Q, go into the 'system sub-menu', select 'filter Q or BW', and select BW.

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An example of this equipment has been tested and found to comply with the following European and international Standards for Electromagnetic Compatibility and Electrical Safety:

Radiated Emissions (EU): EN55013-1 (1996)
RF Immunity (EU): EN55103-2 (1996) RF Immunity, ESD, Burst Transient, Surge, Dips &Dwels
Electrical Safety (EU): EN60065 (1993)

Important Safety Information

Do not remove Covers. There are no user serviceable parts inside, please refer servicing to qualified service personnel. This equipment must be earthed.

CAUTION
RISK OF ELECTRIC SHOCK
DO NOT OPEN
DO NOT EXPOSE TO RAIN OR MOISTURE

ATTENTION
RISQUE DE CHOC ELECTRIQUE
NE PAS ENLEVER
NE PAS EXPOSER A LA PLUIE NI A L'HUMITE

It should not be necessary to remove any protective earth or signal cable shield connections.

Do not defeat the purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wider blade and the third prong are provided for your safety. When the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.

Only use this equipment with an appropriate mains cord.

In the USA the cord should comply with the requirements contained in the Standard for Cord Sets and Power Supply Cords, UL 817, be marked VW-1, and have an ampacity rating not less than the marked rating of the apparatus.

Thanks

Thank you for choosing the TURBOSOUND LMS-D6 for your application. Please spare a little time to digest the contents of this manual, so that you obtain the best possible performance from this unit.

All TURBOSOUND products are carefully engineered for world class performance and reliability.

If you would like further information about this or any other TURBOSOUND product, please contact us.

We look forward to helping you in the near future.

Unpacking the LMS-D6

After unpacking the unit please check carefully for damage. If damage is found, please notify the carrier concerned at once. You, the consignee, must instigate any claim. Please retain all packaging in case of future re-shipment.

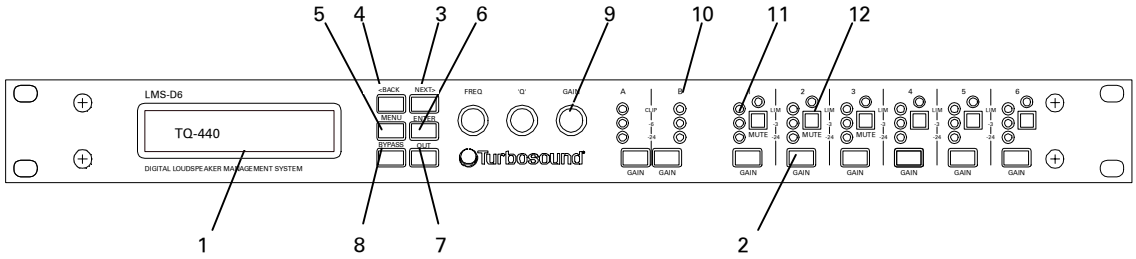
Introduction

The LMS-D6 is a compact and powerful DSP based audio-processing unit, ideally suited for live applications, where it combines the functions of multiple conventional products in a compact 1U high unit. To achieve this the LMS-D6 has 2 inputs and 6 outputs, which can be configured in 5 basic modes, 3 x 2 way, 2 x 3 way, 4 way, 5 way and 6 way crossover. Each input has gain and delay. Each output consists of a high and lowpass filter, 5 bands of parametric equalisation, limiter, delay, gain and polarity controls. User memories are provided, and also a multi-level security 'lock-out' function for all controls. The LMS-D6 is also available with optional AES/EBU inputs and outputs. The LMS-D6 is designed for quick adjustment via easy-to-use front panel controls.

Features

- **Superb audio quality:** carefully optimised double precision processing plus 40 bit internal data path for exceptional dynamic range and sonic quality.
- **A flexible 2 input, 6 output** multi-mode format featuring a choice of 3 x 2 way, 2 x 3 way, 4 + 2 way, 5 + 1 way and 6 way crossover modes with limiters.
- **Each parametric section** provides +15dB to -30dB of gain at centre frequencies between 20Hz - 20kHz with a wide range of Qs from 0.4 to 128. All parameters feature fine resolution with 1/36th octave frequency steps, 0.1dB gain increments and 100 Q settings. Any parametric section can be set for LF & HF shelving response.
- **Six high performance limiters** are provided, featuring a wide range of control over Attack, Release and Threshold parameters. The output meters shows headroom to the limit threshold. The meter time constants track the limiter time constants to show precise power usage.
- **Variable high and low-pass filters** for each output can be set for 12, 18 and 24dB per octave slopes with a choice of Bessel, Butterworth or Linkwitz-Riley responses. Independent control over high & low-pass functions allows asymmetric crossover functions to be realised.
- **Three velocity-sensitive rotary encoders** provide a familiar and easy to use control format with all filter information displayed simultaneously on a backlit LCD display.
- **Delay of up to 650mS** can be independently set for each output with a minimum increment of 2.6µS.
- **Comprehensive standard specification** includes 20 user memories, and Turbosound's pre set memories.
- The LMS-D6 provides **exceptional audio quality** with a full >110dB dynamic range, high sampling rate and minimal filtering.
- **AES / EBU digital inputs and outputs** are available as an option.

Front Panel Functions



1. **LCD Display** - Shows menu options, output information and various parameters being adjusted.

2. **Gain Keys** - Two input and six-output 'gain' keys allow instant access to the gain screen for each channel. Pressing a second time selects the last function edited.

3. **Next Key** - Moves the display forwards through the list of available parameters for the current input or output channel.

4. **Back Key** - Moves the display backwards through the list of available parameters for the current input or output channel.

5. **Menu Key** - Activates the main menu on the LCD display. Pressing a second time selects the last menu edited. Different menus are selected by pressing the ***'BACK'*** and ***'NEXT'*** keys or using the ***'FREQ'*** control.

6. **Enter Key** - Enters the chosen menu and confirms menu selections.

7. **OUT Key** - Exits the menu.

8. **Bypass Key** - Allows the currently displayed parametric section to be bypassed. (Note: The Highpass / Lowpass filters and limiters can not be bypassed.)

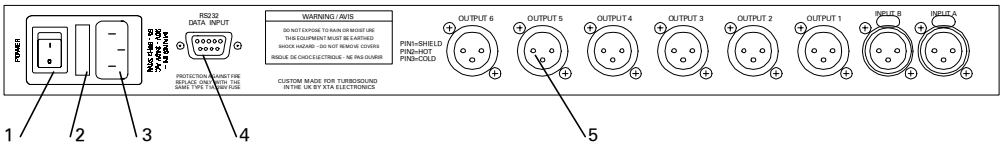
9. **Parameter Controls** - The three velocity sensitive rotary encoders allow the relevant parameter, on the LCD screen, to be adjusted.

10. **Input Meters** - Displays available headroom before input clipping occurs. The bottom green LED is set at -24dB, with the orange 0dB LED set at 3dB below clipping. The top, red LED displays digital overflow and can therefore light without all the other LEDs becoming illuminated.

11. **Output Meters** - Displays headroom before limiting occurs. The bottom green LED is set at -24dB, with the orange 'LIM' LED set at the limiter threshold for that channel. The top, red LED indicates 4dB of limiting.

12. **Mute Keys** – One mute key per output channel.

Rear Panel Functions



1. Power Switch.

2. Mains Fuse - Located in a finger-proof fuseholder adjacent to the mains inlet. Always replace this fuse with the correct type as shown on the rear panel legend. (N.B. A spare fuse is located in this holder.)

3. Mains Power - Connected via a standard IEC socket. A compatible power cord is supplied with the unit.

4. External - RS232 via a 9-pin DIN DEE socket, for connection to a PC.

5. XLR Inputs and Outputs - 3 pin XLR connectors are provided for each audio input and output. All terminations are fully balanced, pin 2 Hot, pin 3 Cold and pin 1 Screen (shield).

OPERATING THE LMS-D6

Preliminary Set-up

The following procedure should be followed when first installing the LMS-D6.

Recall a Factory Preset

To do this press '***MENU',*** use the ***'BACK'*** or ***'NEXT'*** key to select 'Xover sub-menu'. Press Press ***'ENTER'***; use the ***'BACK'*** or ***'NEXT'*** key to select 'Load a Xover'. Press ***'ENTER'***, use the ***'BACK'*** or ***'NEXT'*** key to scroll through the preset programs. Press ***'ENTER'*** when the desired program appears. The crossover will automatically load.

Design your own crossover

To do this press ***'MENU'***, use the ***'BACK'*** or ***'NEXT'*** key to select 'Xover sub-menu'. Press ***'ENTER'***; use the ***'BACK'*** or ***'NEXT'*** key to select 'Design a Xover'. Press ***'ENTER'***, use the ***'BACK'*** or ***'NEXT'*** key to select desired configuration and follow the set-up wizard to design your X-over.

(N.B. When in a menu use the ***'BACK'*** and ***'NEXT'*** keys to display menu options. When the required menu is shown, press ***'ENTER'*** to confirm selection. The current selection will be marked by a '*' star.)

Use the ***'GAIN'*** key on each channel with the ***'BACK'*** and ***'NEXT'*** keys to select HPF, LPF, parametrics etc. Note: when designing a new crossover the HP and LP filters will be set to their defaults, see appendix 2.

Note: If no action is taken in the menu mode the unit will return to normal 'default' mode. Repeat above instructions to return to menu mode.

Menu Selections

The following menu selections are available. To access menus, see instructions under preliminary set-up above.

Xover Sub-Menu:
Load a Xover: Loads a pre-defined crossover.
Design a Xover: Setup wizard for designing a crossover.
Store a Xover: Stores all output settings as a defined crossover.

Security Sub-Menu: Locks the unit with a unique user defined 4 digit code. 4 options are available: changes only, changes + view, changes + mutes, everything. **Caution: Do not enter this menu option before reading and understanding the instructions.**

System Sub-Menu:

System Status: Displays unit information including software version and temperature.
LCD Contrast: Adjusts LCD contrast.
LED Brightness: Adjusts LED brightness.
Temperature Alarm: Sets a temperature warning value in Centigrade.
Wake-up Time: Sets whether or not the unit starts up in mute.
Output Meters: Selects output meters to be pre or post mute.
Filter Q or BW: Selects whether Q or bandwidth is displayed in the parametric screens.

Interface Sub-Menu:

Interface Setup: Selects baud rate

AES / EBU Sub-Menu:

Routing options: Selects various routing options.
AES diagnostics: Shows the complete status of the input AES signal. Available only if the AES option is fitted.

(For more in-depth information on menu functions, refer to pages 17, 17 & 18.)

LMS-D6 CONFIGURATIONS

Introduction

To simplify set-up of the LMS-D6, 5 crossover modes are menu selectable. These all have parametric equalisers, high and low pass filters, limiters, gain and delay. 2 x 3 way and 3 x 2 way crossover modes have the option available to provide precise 'ganged' parameter adjustment for stereo sources.

Crossover Modes

All crossover modes feature adjustable crossover frequencies with a choice of slopes, 5 bands of driver compensation E.Q. per output and delay time plus limiters for each output. Phase reverse is also provided for each output.

Filter slopes

A choice of Bessel or Butterworth slopes at 12/18/24dB per octave and Linkwitz-Riley at 24dB per octave are provided. Since Low and High pass functions are separately adjusted, asymmetric slopes are easily achieved, if required. It should also be noted that the turnover frequency displayed on the LMS-D6 is the -3dB point for all slopes except 24dB Linkwitz-Riley where the -6dB point is shown. If the -6dB point is to be used for the Bessel or Butterworth filter, take the required crossover frequency, multiply this by the appropriate factor from the following table and then select the closest available frequency on the LMS-D6's display.

Filter Type	High pass filter factors	Low pass filter factors
Bessel 12dB/octave	1.45	0.69
Butterworth 12dB/octave	1.31	0.76
Bessel 18dB/octave	1.37	0.73
Butterworth 18dB/octave	1.19	0.84
Bessel 24dB/octave	1.35	0.74
Butterworth 24dB/octave	1.15	0.87

Please note that unlike conventional analogue crossovers, crossover points and slopes are set with absolute accuracy since component tolerance problems do not occur.

Time Alignment

A further advantage of the LMS-D6 over conventional products is the provision of an independently adjustable delay section for each output. This allows the true arrival time from multiple drivers to precisely aligned rather than relying on the compromise 'phase adjust' approach. Delay time is adjustable in 2.6µS steps (1mm).

Output Limiters

High performance digital limiters are provided for each output with control over attack time, release time and threshold level parameters This level of control allows the user to balance the required subjective quality of the limiter against the driver protection requirements. It does also mean that an incorrectly set limiter may sound awful! In particular, as with all limiters, using too fast an attack or release time will result in excessive low frequency distortion. In the design a crossover sub-menu there is an option for automatic limiter time constants. In this mode the time constants will be automatically set from the Highpass filter frequency. See table below.

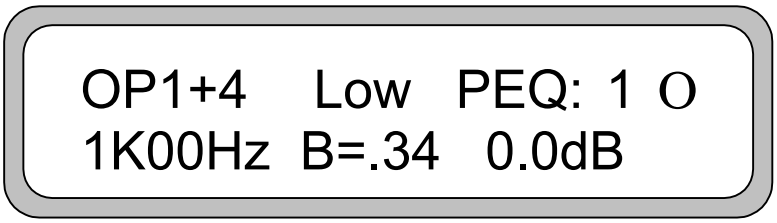
Table of automatic attack and release times

The time constants are set by the high pass filter frequency for that channel.

High pass filter	Auto attack time	Release
<10Hz – 31Hz	45mS	x16 (720mS)
31Hz – 63Hz	16mS	x16 (256mS)
63Hz – 125Hz	8mS	x16 (128mS)
125Hz – 250Hz	4mS	x16 (64mS)
250Hz – 500Hz	2mS	x16 (32mS)
500Hz - 1kHz	1mS	x16 (16mS)
1kHz – 2kHz	0.5mS	x16 (8mS)
2kHz – 22kHz	0.3mS	x16 (4mS)

FUNCTION SCREENS

Parametric Equaliser Screen



All modes feature a total of 30 bands of fully flexible parametric equalisation (5 per output), with all sections selectable to Low or High frequency shelving response.

Each parametric section can be positioned at a frequency from 20Hz to 20kHz and features a wide range of 'Qs' to produce response curves ranging from broad to notch. The gain control ranges from +15dB to -30dB in 0.1dB steps. Frequency steps are 1/36 octave resolution for precise control. Since all filtering is achieved in DSP all settings are re-settable with absolute accuracy and in ganged mode parameters track identically. Very narrow band notch filters (maximum Q of 128) can be achieved and unlike analogue filters these 'tight' Q filters are entirely stable. The maximum notch depth is -30dB.

Parametric filters are carefully implemented using Double Precision processing. This method is costly in terms of processing power but yields substantial benefits in terms of the LMS-D6's exceptional noise performance and greatly improved low frequency stability.

To adjust parametric settings:

Use the ***'FREQ'*** control for the frequency.

Use the ***'Q'*** control for the Q.

Use the ***'GAIN'*** control for the gain.

(N.B. To show parametric filters in bandwidth (BW) rather than Q, go into the system sub-menu, select 'filter Q or BW', select BW.)

High and Lowpass filter Screens

Each output has an independent high pass filter and an independent low pass filter. Both filters have a range of selectable slopes, which are Bessel 12dB, 18dB and 24dB, Butterworth 12dB, 18dB and 24dB, and Linkwitz Riley 24dB.

Highpass filters have a range of <10Hz (through) to 16kHz and Lowpass filters have a range of 22kHz (through) to 59Hz in 1/36 octave steps.

HPFs and LPFs can be asymmetrical set.

To adjust HPF/LPF settings:

Use the ***'FREQ'*** control for the frequency.

Use the ***'Q'*** control for the slope.

Limiter Screen

Each output has an independent high performance limiter.

All limiters have an attack range of 0.3mS to 90mS, release times are 4, 8, 16 and 32 times the attack time and thresholds range from +22dB to –10dB in 1dB steps.

If the automatic limiter time constant option is in use, all limiter screens will say 'automatic' and the time constants will be set from the Highpass filter frequency. A table of dB to Vrms is in appendix 1.

The output meters are linked to the time constants of the limiters so true output metering is achieved.

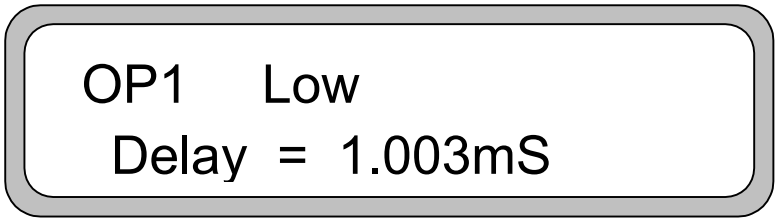
To adjust limiter settings:

Use the ***'FREQ'*** control to adjust the attack time.

Use the ***'Q'*** control for the release time.

Use the ***'GAIN'*** control for the limiter threshold.

Delay Screen



Each output has an independent delay time control. This can be adjusted in 2.6µS steps or in 1mS steps giving complete control over driver time alignment.

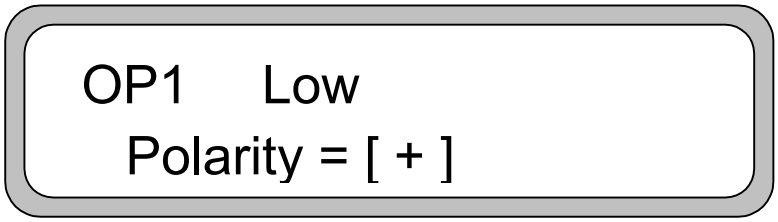
Input delay (base delay) is adjustable in 1mS steps only.

To adjust delay settings:

Use the ***'FREQ'*** control for coarse control. (1mS steps)

Use the ***'Q'*** control for fine control. (2.6µS steps)

Polarity Screen



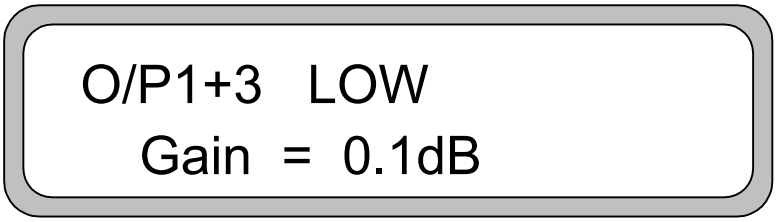
Each output has an independent polarity screen. This gives the flexibility to reverse (flip by 180°) the phase of individual outputs.

(N.B. When the outputs are ganged, the polarity screens remain individual.)

To adjust the polarity:

Use the ***'GAIN'*** control to go between + and -.

Gain Screen



Each output and input has an individual gain screen. The outputs have a range of +15dB to –40dB, adjustable in 0.1dB steps and the inputs have a range of +6dB to –40dB, again adjustable in 0.1dB steps.

To adjust the gain:

Use the ***'GAIN'*** control.

X-over Sub-Menu

Press ***'MENU'*** and select X-over Sub-menu using the ***'BACK'***, ***'NEXT'*** and ***'ENTER'*** keys. Three options are available in this sub-menu which are:

Load a Xover **Loads a stored crossover.**

Design a Xover **Opens a wizard to design a crossover. Options include format type, ganging of outputs, routing and automatic limiter time constants.**

Store a Xover **Stores a X-over (all output settings) to one of 9 locations. Crossovers can be named, using the same method as memories, with up to 16 characters which appear in the default screen.**

Security Sub-Menu

Press ***'MENU'*** and select Security Sub-menu using the ***'BACK'***, ***'NEXT'*** and ***'ENTER'*** keys. Press ***'ENTER'*** to load one of the four selections. (See below) A four-digit security code will then be asked for. This can be entered by using the ***'FREQ'*** control, to select a character, and the ***'BACK'*** and ***'NEXT'*** keys to move to the next character. Alternatively, the ***'GAIN'*** keys can be used to enter a code by pressing any combination of the eight buttons. Each ***'GAIN'*** key represents its channel labelling, so any combination of A, B, 1, 2, 3, 4, 5 and 6 can be used as a code.

Lock options:

Changes only: This option locks all parameters so that no changes can be made, including all menus.
Changes + view: This option locks all parameters and the viewing of them on the LCD including all menus.
Changes + mutes: This option locks all parameters, including all menus, and disables all mute keys.
Everything: This option locks all parameters and the viewing of them, including all menus, and disables all mute keys.

To 'unlock' the security system, press the ***'MENU'*** key and enter correct code.

IMPORTANT - Please Note that once the security system is initiated only re-entering the correct code will 'unlock' the LMS-D6's functions. Please note the code! If the security code number is inadvertently lost contact your local TURBOSOUND sales office.

System Sub-Menu

Press ***'MENU'*** and select System Sub-menu using the ***'BACK'***, ***'NEXT'*** and ***'ENTER'*** keys. Several options are available in this sub-menu which are:

System Status: Displays unit information including software version and temperature. *Curr. Temp.* = current temperature in degrees Celsius.
Max1. Temp. = maximum temperature this session.
Max2. Temp. = maximum temperature ever reached.

LCD Contrast: Adjusts the LCD contrast from 0 to 100.

LED Brightness: Adjusts the LED brightness from 1 to 15.

Temperature Alarm: Sets a temperature warning between 20 and 80°C. The default screen will flash 'ALARM. Temp = *n*°C' when the specified temperature is reached. (N.B. the warning does not affect the units' performance in any respect.)

Wake-up Time: Sets how the unit starts up with one of the following options.

0 to 60 seconds: Waits the specified time before unit wakes up.
Mute hold: Turns on and holds all output mutes when turned on.
(N.B. Wake-up is a slow ramp in level for about 5 seconds.)

Output Meters: Selects whether the output meters are pre or post mute.

Filter Q or BW: Selects whether 'Q' or Bandwidth is displayed in the parametric screens.

Interface Sub-Menu

Press ***'MENU'*** and select X-over Sub-menu using the ***'BACK'***, ***'NEXT'*** and ***'ENTER'*** keys.

Interface Setup

Opens a wizard to configure the remote interface. Baud rate can be configured to down load new presets.

AES / EBU Sub-Menu

Connection of AES/EBU signals is via the existing rear panel XLR connectors.

Menu Selections

With the AES/EBU option fitted, AES Receive and Diagnostic modes are provided.

Equalisation Curves

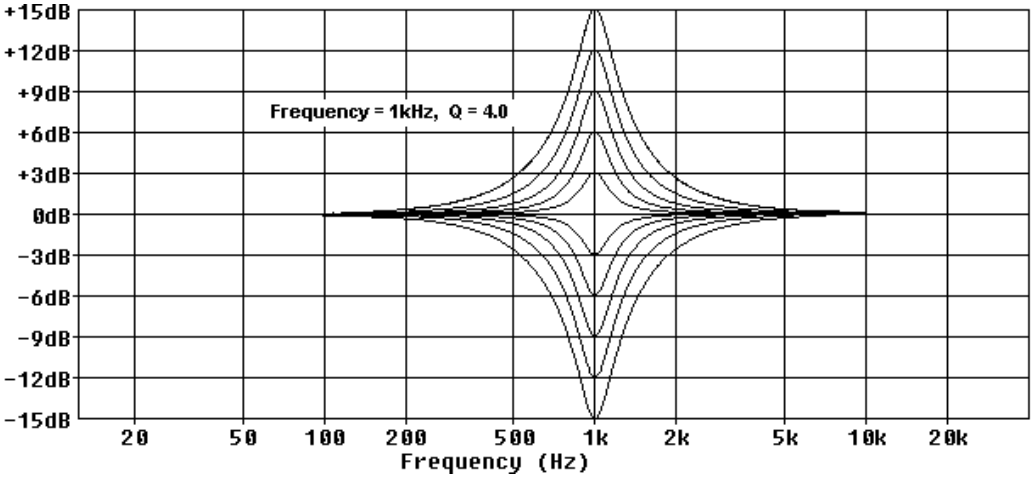


Figure 1 - Parametric filter gain curves.

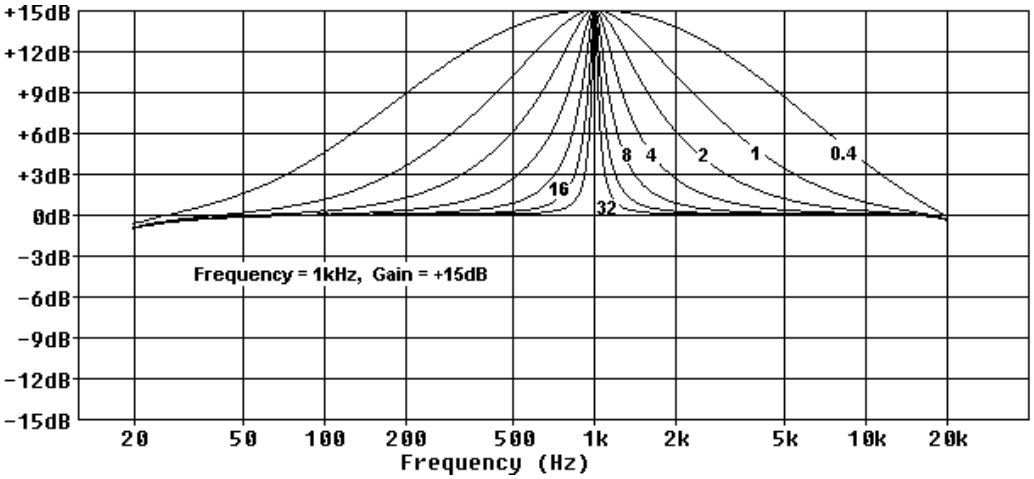
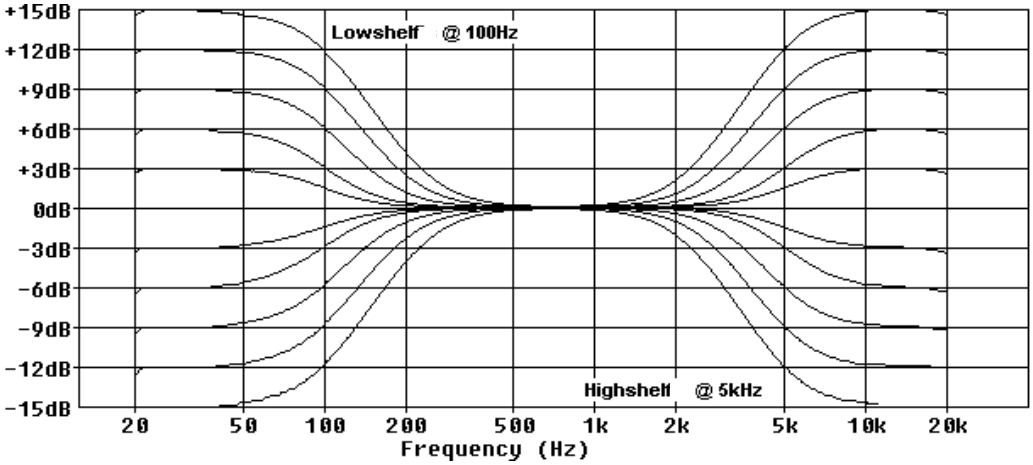


Figure 2 - Parametric filter 'Q' curves.



F

igure 3 - Parametric filter High and Low shelf curves.

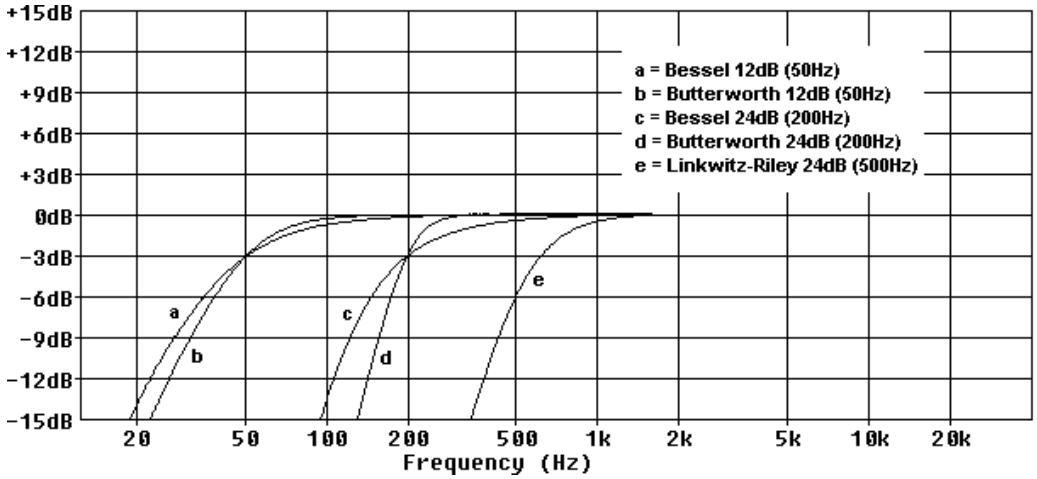


Figure 4 - Highpass filter curves.

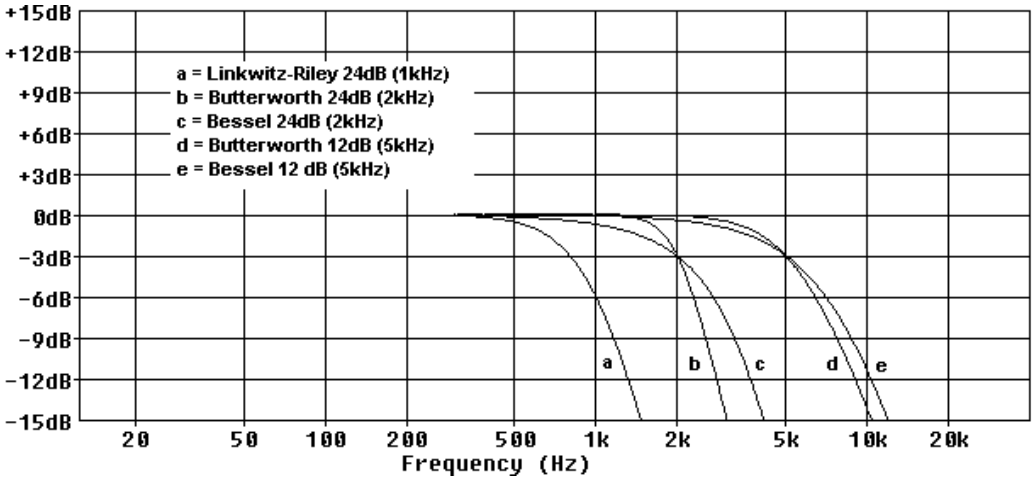


Figure 5 - Lowpass filter curves.

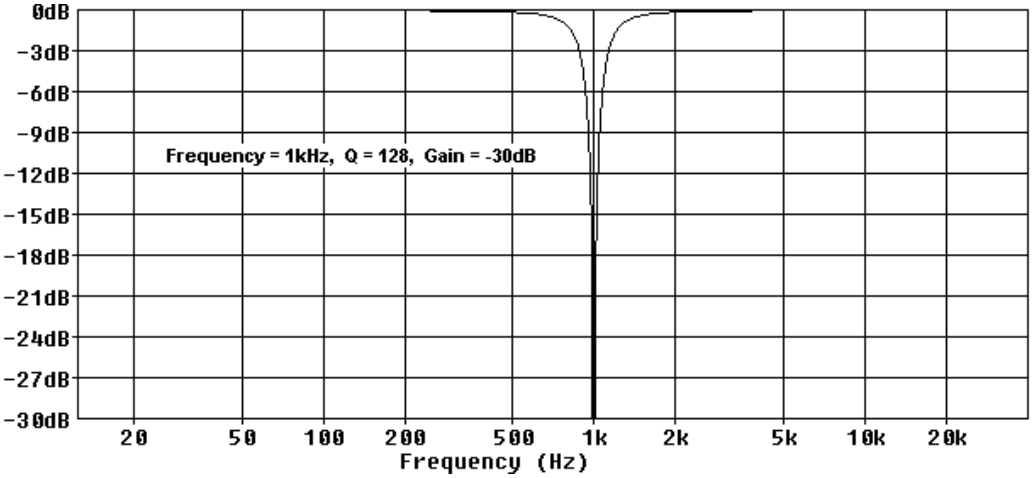


Figure 6 - Parametric filter with high 'Q' to achieve notch response.

Specifications

Inputs	Two electronically balanced ◆
Impedance	> 10k ohms
CMRR	>65dB 50Hz - 10kHz
Outputs	Six electronically balanced ◆
Source Imp	< 60ohms
Min. Load	600ohms
Max. Level	+20dBm into 600 ohm load
Frequency Resp.	±0.5dB 20Hz - 20kHz
Dynamic Range	>110dB 20Hz -20kHz. Unwtd
Distortion	< 0.02% @ 1kHz, +18dBm
Maximum Delay	650 mS. (Increment 2.6 µS)
Output gain	adjustable +15dB to -40dB in 0.1dB steps and mute
Input gain	Adjustable +6dB to -40dB in 0.1dB steps
Parametric Equalisation	
Filters	5 Sections per output
Filter gain	+15dB to -30dB in 0.1dB steps
Centre frequency	20Hz - 20kHz, 1/36 octave steps. (368 positions)
Filter Q / BW	0.4 to 128 / 2.5 to 0.008
(Sections switched to shelving response)	
Low frequency	20Hz - 1kHz
High frequency	1kHz - 20kHz
Shelf gains	±15dB in 0.1dB steps
High and Lowpass Filters	
Filters	1 of each per output
Frequency (HPF)	10Hz - 16kHz, 1/36 octave steps
Frequency (LPF)	60Hz - 22kHz, 1/36 octave steps
Response	Bessel / Butterworth 12/18/24dB /oct and Linkwitz-Riley 24dB /oct
Limiters	
Threshold	+22dBu to -10dBu
Attack time	0.3 to 90 milliseconds
Release time	4, 8, 16 or 32 times the attack time
Display	2 x 20 character backlit LCD
Input meter	2 x 6 point, -24dB to digital clip
Output meter	6 x 6 point, -24dB to +4dB into limit
Connectors	
Inputs	3 pin female XLR
Outputs	3 pin male XLR.
Power	3 pin IEC
Power	60 to 250V ±15% @ 50/60Hz
Consumption	< 20 watts.
Weight	3.5kg. Net (4.8kg. Shipping)
Size	1.75"(1U) * 19" * 11.8" (44 * 482 * 300mm) excluding connectors.
Options	◆ = Transformers available.

Due to continuing product improvement the above specifications are subject to change.

WARRANTY

This product is warranted against defects in components and workmanship only, for a period of one year from the date of shipment to the end user. During the warranty period, TURBOSOUND will, at its discretion, either repair or replace products which prove to be defective, provided that the product is returned, shipping prepaid, to an authorised TURBOSOUND service facility.

Defects caused by unauthorised modifications, misuse, negligence, act of God or accident, or any use of this product that is not in accordance with the instructions provided by TURBOSOUND, are not covered by this warranty.

This warranty is exclusive and no other warranty is expressed or implied. TURBOSOUND is not liable for consequential damages.

APPENDICES

Appendix 1

Limiter threshold in dB to Vrms lookup table.

DB	Vrms	dB	Vrms
+22	9.75	+5	1.38
+21	8.69	+4	1.23
+20	7.75	+3	1.09
+19	6.90	+2	0.98
+18	6.15	+1	0.87
+17	5.48	0	0.77
+16	4.89	-1	0.69
+15	4.36	-2	0.62
+14	3.88	-3	0.55
+13	3.46	-4	0.49
+12	3.08	-5	0.44
+11	2.75	-6	0.39
+10	2.45	-7	0.35
+9	2.18	-8	0.31
+8	1.95	-9	0.27
+7	1.73	-10	0.24
+6	1.55		

Calculation:

Vrms = 0.7746 x 10 ^ (dBu / 20)

Appendix 2

Default X-over settings and names for all formats.

X-over	Output 1	Output 2	Output 3	Output 4	Output 5	Output 6
2x2 way+Ms	Low	High	Low	High	Msub	Aux
	120Hz – 1k82Hz	1k82Hz – 22kHz	120Hz – 1k82Hz	1k82Hz – 22kHz	24.8Hz – 120Hz	<10Hz – 22kHz
2 x 3 way	Low	Mid	High	Low	Mid	High
	22.1Hz – 120Hz	120Hz – 1k82Hz	1k82Hz – 22kHz	22.1Hz – 120Hz	120Hz – 1k82Hz	1k82Hz – 22kHz
4 way + 2	Low	LoMid	HiMid	High	Aux	Aux
	15Hz – 149Hz	149Hz – 1k31Hz	1k31Hz – 8kHz	8kHz – 22kHz	20.1Hz – 22kHz	20.1Hz – 22kHz
5 way + 1	Sub	Low	LoMid	HiMid	High	Aux
	15Hz – 80.3Hz	80.3Hz – 180Hz	180Hz – 1k31Hz	1k31Hz – 8kHz	8kHz – 22kHz	20.1Hz – 22kHz
6 way	LoSub	Sub	Low	LoMid	HiMid	High
	15Hz – 80.3Hz	80.3Hz – 149Hz	149Hz – 1kHz	1kHz – 4kHz	4kHz – 10k1Hz	10k1Hz – 22kHz

Note: All filters set to 24dB Linkwitz-Riley.